IN THE UNITED STATES AND TRADEMARK OFFICE

Application No.:

U.S. National Serial No.:

Filed :

PCT International Application No.: PCT/EP2003/013654

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That I am knowledgeable in the German language in which the above identified International Application was filed, and that, to the best of my knowledge and belief, the English translation of the International Application No. PCT/EP2003/013654 is a true and complete translation of the above identified International Application as filed.

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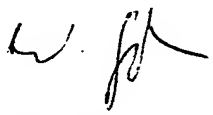
Date: May 30, 2005



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Device and Method for Fastening Façades Plates

The invention relates to a device and a method of fastening façade plates.

The invention relates in particular to the area of restoration of buildings on which façade plates are installed. Façade plates are usually fastened with metal anchors on a supporting wall of a building. The metal anchors divert a vertical load of the façade plates into the supporting wall. Furthermore, the metal anchors hold the façade plates installed at a distance to the supporting wall in the horizontal direction.

During the course of time, thermally induced tension and aggressive exhaust gases in the air may cause the metal anchors to break out. This may cause the façade plates to become disconnected and to fall from the building. This presents a significant danger to passers-by. Facades with damaged façade anchors must be immediately renovated or restored.

As defined by the state of technology, it is required that the building either be covered with new façade plates or the old façade plates must be removed and the façade redone with new anchors. Both renovation measures are extremely costly and time-consuming.

In addition to this, it is also known that for the securing of loose façade plates must be provided a reach-through hole bored through the façade plate and this must be secured to the supporting wall with a screw. Although this prevents the façade plates from falling off, the façade plates are not held in the horizontal direction. In particular, during a

storm, such façade plates become loose and wobble. This may cause the façade plate to break or fall off.

The object of the invention is to remove the disadvantages of the state of technology. In particular, a device or a method is to be specified with which an enduring renovation of façades is possible with simple and inexpensive means.

This object is solved by the features of claims 1 and 12. Useful embodiments result from the features of claims 2 to 11 and 13 to 16.

The suggested device makes it simple to renovate façades. When façade plates must be re-mounted, they do not need to be removed. They can be re-mounted right where they are. With this, the suggested device ensures both a vertical load diversion and a horizontal fixation of the façade plates.

An example will now be used to describe the invention in more detail based on the drawing. The figures are listed below:

Fig. 1 a first cross-section view through a device,

Fig. 2 a cross-section view in accordance with intersecting line C - C in Fig. 1,

Fig. 3 a cross-section view in accordance with intersecting line B - B in Fig. 1,

Fig. 4 a cross-section view in accordance with intersecting line A - A in Fig. 1,

Fig. 5 a second cross-section view of the device, wherein a annular space is filled in and

Fig. 6 a cross-section view in accordance with intersecting line C - C in Fig. 5.

In the figures, 1 designates a supporting wall of a building and 2 designates a façade plate held at a distance. An anchor as provided by the invention to fasten façade plate 2 has a holding element 3 which is usefully made of plastic and from which a threaded bar 4 extends into a hole bored in the supporting wall. A first end E1 of the holding element 3 is located in the vicinity of the threaded bar 4. The second end which is at a distance from the threaded bar 4 is designated E2. A channel 7 extends from an annular space 6 created in the holding element 3 to the second end E2. An opening of the channel 7 provided on the second end E2 is closed with a flap valve 8. A flange 9 is located on the first end E1 of the holding element 3. A silicon tube 10 surrounds the holding element. The silicon tube 10 is fastened with a tube binder 11 on the flange 9. The outer circumference of the holding element 3 is tapered conically in the direction of the threaded bar 4. It rests by the silicone tube 10 positively on one of the reach-through bored holes 12 which reaches through the façade plate 2. An O-ring which is designated as 18 is provided in the vicinity of the second end E2 of the holding element 3 between the holding element 3 and the silicone tube 10.

The threaded bar 4 engages in a mesh sleeve which is fixated in the bored hole 5 with composite mortar 14.

The cross-section view shown in Fig. 2 illustrates clearly again the formation of the annular space 6 surrounded by the silicone tube 10. The cross-section view in Fig. 3 shows the conical section of the holding element 3 which rests by the silicon hose 10 positively on the wall of the also conically formed reach-through bored hole 12. Fig. 4 shows a cross-

section view or a view of the top of the second end E2 of the anchor located in the reach-through bored hole 12. An undercut structure 15 provided on the second end E2 is made in one-piece with the holding element 3.

Fig. 5 shows the anchor in accordance with Fig. 1, wherein here the channel 7 and the annular space 6 are filled with a viscoplastic hardenable resin 16. Due to the elasticity of the silicon tube 10 and an injection of the viscoplastic hardenable mass, for example two-component epoxy resin, a bulge forms in the area of the annular space 6, which bulge keeps the holding element 3 from shifting in the horizontal direction. The O-ring 18 reliably prevents an undesired escape of the two-component epoxy resin between the holding element 3 and the silicon tube 10.

Fig. 6 shows a cross-section view in accordance with intersecting line C - C. Here again the annular space 6 filled with the viscoplastic mass 16 is clearly shown.

To anchor the façade plate 2, it has been shown to be useful that the following working method be performed:

First, a through bored hole is made through the façade plate 2 with a drill and with the same drill the bored hole 5 is made immediately afterwards. Then the through bored hole is conically widened so that the cone tapers towards the supporting wall 1. Then composite mortar 14 or synthetic resin is injected into the bored hole 5 and a mesh sleeve or a lattice dowel is inserted. Then the anchor with the threaded bar 4 is inserted into the mesh sleeve 5 until the holding element 3 or the silicon tube 10 surrounding the holding element rests flat positively on the conic, through bored hole 12. After the composite mortar 14 has hardened, the holding element 3 is turned clockwise to create a weak twisting of the

holding element 3 with the façade plate 2. Naturally such a twisting can only be created when the façade plate 2 is still held at a distance with the old anchors (not shown here) against the supporting wall 1. Twisting of the holding element 3 by turning it clockwise can also be omitted if the O-ring 18 is provided.

After the holding element 3 has been twisted with the façade plate 2, a specified amount of two-component epoxy resin is pressed into the annular space 6 with the flap valve 8. This causes the elastic wall formed from the silicon tube 10 surrounding the annular space to bulge out. When the O-ring 18 is provided, a reliable sealing effect is always achieved even with a slightly tilted utilisation of the holding element 3 in the through bored hole 12. An escape of the two-component epoxy resin into the area of the second end E2 is reliably avoided. After hardening of the viscoplastic hardenable mass 16, the holding element 3 is positioned essentially unshiftably in the through bored hole 12. It is held elastically in the through bored hole 12 by the elastic properties of the silicon tube 10. The suggested anchor holds the façade plate 2 in horizontal direction. At the same time, a vertical load diversion via the supporting wall 1 is also achieved.

Finally, a remaining opening of the through bored hole 12 is filled, for example, with a filler mass 17 containing a binding agent. The binding agent can be cement or a synthetic material. The undercut structure 15 is used for a close bond of the holding element 3 with the filler mass 17. Due to the undercut structure 15, the hardened filler mass 17 cannot detach itself from the holding element 3.

In an embodiment, it can also be that an axial recess or a blind hole is provided on the second end E2. Such a blind

hole is used to fasten a cover to cover the opening formed by the through bored hole 12. Such a cover which can be made of refined steel, for instance, is preferably used for façade plates 2 which are made of glass.

The suggested anchor is particularly advantageous because this can also be used to compensate for thermally-created recesses of the façade plates 2. The compensation is achieved by the elastic properties of the silicon tube 10 surrounding the holding element 3. Undesired bending of the façade plates 2 can thus be reliably avoided.

Reference listing

1	Supporting wall
2	Façade plate
3	Holding element
4	Threaded bar
5	Bored hole
6	Annular space
7	Channel
8	Flap valve
9	Flange
10	Silicon tube
11	Tube binder
12	Through bored hole
13	Mesh sleeve
14	Composite mortar
15	Undercut structure
16	Viscoplastic hardenable mass
17	Filler mass
18	O-ring

E1	First end
E2	Second end